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Foreword

This final draft ETSI Guide (EG) has been produced by ETSI User Group (USER), and is now submitted for the ETSI standards Membership Approval Procedure.

Modal verbs terminology

In the present document "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

The present document has been produced by STF 543 experts.

The concept of the full Project is to define 5 dimension model called **ACIFO.** The 5 dimension model is based on 5 submodels defined as:

- Architectural Model **A**cifo: defines the global structure, including semantics and is optimized for the stated objectives.
- Communication Model a**C**ifo: defines the exchange protocols, including APIs and HMIs, over three planes:
    - Management (Monitoring)
    - Control
    - Usage
- Information Model ac**I**fo: defines the information of the whole ecosystem (equipment, network, applications, services, HMIs, User, etc.) from the offer to the availability of resources for Users, Providers and any other partners. It is a knowledge data base representing the whole ecosystem.

- Functional Model aci**F**o: defines the functionalities (the process) to compose any service based on "micro-services".
- Organization Model acif**O**: defines the role of any actor and which actor is responsible of each action. ("Who is doing what?").

These five dimensions should be shared by the user and the supplier/provider. For the user, it should be possible to define (or to choose) the level of autonomy and control for the personalized composition of services.

The four deliverables produced by STF 543 define the different dimensions:

- ETSI TR 103 438 [i.1] focuses on the Architecture and the Organization. It includes the use cases and the results of the survey.
- ETSI EG 203 602 (the present document) focuses on the information and the functionalities. It is dedicated to the user. It provides analysis and recommendations from the information and functionalities.
- ETSI TR 103 603 [i.2] addresses all the dimensions to the supplier, in order to produce the APIs according to the user expectations and whatever the number and types of additional suppliers.
- ETSI TR 103 604 [i.3] focuses on the communication and in particular on the HMIs.

For example, for Energy (production, distribution, consumption), the supplier will create an API for the user. The information will be exchanged between the supplier and the user, but will not be used only by the supplier: the user will have access to all the information and will be able to use this information to optimize their energy consumption. This data base is a source to provide new services and new applications (for the user and for the supplier). One major challenge and constraint is to ensure that all the private data may be checked and monitored by the user (the contract needs to define clearly these points). The data are not used only by the supplier, the user should have access to the data and may refuse that the data be used or known → an interaction "cursor" between the user and the supplier defines the freedom (GDPR).

1 Scope

The present document defines guidance to the user in order to build its own service composition with the expected and relevant Quality of Experience (QoE) and to ensure their data privacy.

It focuses on analysis of functionalities and information from the user point of view.

It provides recommendations from functional and informational elements.

The present document defines the intersection of the "user centric" and the "user interface" which contains the different profiles of the user and equipment to adapt to user's new needs. Thus according to the possibilities offered by the equipment, the networks and the software platforms, a personalization is possible.

The present document includes the results of an additional survey that complete the results obtained in the initial survey, defined in ETSI TR 103 438 [i.1].

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI TR 103 438: "User Group; User centric approach in Digital Ecosystem".

[i.2] ETSI TR 103 603: "USER Guidance for providers and standardization makers".

[i.3] ETSI TR 103 604: "USER; User centric approach Qualification of the interaction with the digital ecosystem".

[i.4] ETSI EN 301 549: "Accessibility requirements suitable for public procurement of ICT products and services in Europe".

[i.5] Directive on Security of Network and Information Systems and the General Data Protection Regulation (GDPR) Regulation (EU) 2016/679.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the following terms apply:

ACIFO: 5-dimension model, based on recommendations and common objectives for Users and Providers, giving the capability for the User to compose the needed services

NOTE: The 5-dimension model creates one unique and integrated solution.

cloud: network of remote servers hosted on the Internet and used to store, manage, and process data in place of local servers or personal computers

dew: programming model for enabling ubiquitous, pervasive, and convenient ready-to-go, plug-in facility empowered personal network

NOTE: Dew computing is a new computing paradigm appeared after the widely acceptance of cloud computing. Dew computing has two key features: first, local computers (desktops, laptops, tablets, and smart phones) provide rich micro-services independent of cloud services; second, these micro services inherently collaborate with cloud services. Dew computing concerns the distribution of workloads between cloud servers and local computers, and its focus is the software organization of local computers. The goal of dew computing is to fully realize the potentials of local computers and cloud services.

edge: computation largely or completely performed on distributed devices

equipment (terminal): in the present document, large range of user and provider equipment, including terminals, gateways, boxes, routers

fog: decentralized computation, data storage and application services

NOTE: Fog computing, also known as fog networking or fogging, is a decentralized computing infrastructure in which data, processing, storage and applications are distributed in the most logical, efficient place between the data source and the cloud. Fog computing essentially extends cloud computing and services to the edge of the network, bringing the advantages and power of the cloud closer to where data is created and acted upon.

micro-service: basic and simple service (with SoA properties) that can be combined for the composition of services as expected by the User

NOTE: The basic concept behind this term is that each service performs a unique feature (e.g. for security, "authentication" is a micro-service, for discovery, "find" is a micro-service).

profile: information template (model) to provide or to access to personalized services

user-centric: user who is the heart of the ecosystem

NOTE: This means that the user constrains the whole environment, unlike other contexts where that is the application (application-centric), or network (network-centric) or the system (system-centric) which constrains the context.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

API	Application Programming Interface
AV	AntiVirus

CD	Compact Disc
DVD	Digital Versatile Disc
EU	European Union
GDPR	General Data Protection Regulation
HMI	Human Machine Interface
https	hypertext transfer protocol secure
ID	IDentity
IMEI	International Mobile Equipment Identity
MIPs	Microprocessor without Interlocked Pipeline stages
NGN	New Generation Network
OS	Operating System
PaaS	Platform as a Service
QoS	Quality of Service
QoE	Quality of Experience
RFID	Radio Frequency IDentification
SD	Secure Digital
SLO	Service Level Objective
SMS	Short Message Service
USB	Universal Serial Bus
UX	User eXperience
VOD	Video On Demand
Wi-Fi	Wireless Fidelity

4 User in front of the service platform

4.1 From settings to personalized service composition

4.1.1 Generic model

The generic model from the User point of view, as defined in ETSI TR 103 438 [i.1], is shown in figure 1.

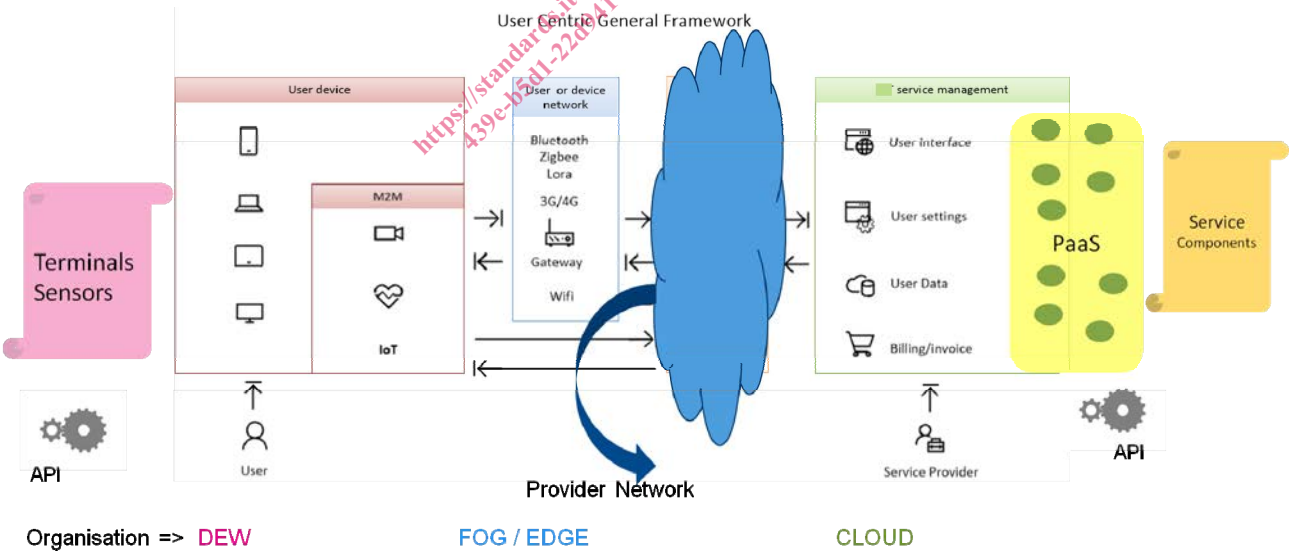

Figure 1: "User-Centric" generic model

What are the reading keys of this generic model of the digital ecosystem as proposed in ETSI TR 103 438 [i.1]?

The emerging usages and the providers' strategies will be put in perspective with the new emerging paradigms:

- On one hand, the human dimension, the more active role of users, the consumers behavior (mobility, social networks, interest groups, groups of customers, etc.), the need of service personalization, the wish that all the technologies are available for everyone and that the virtual reality is supporting the human reality.

- On the other hand, services are dematerialized, which changes the way to design services, the assembly of services, the way to deliver services to consumers and to ensure service continuity and even the consumption modes of the user who becomes more and more the " master of the game".

The global objective is to facilitate access to usages in providing personalized information at the right time.

That means that the relationship between users and providers are evolving significantly. From the passive client incurring offers to the active user who takes ownership of the central role, applicant of innovation, personalization and freedom.

This "user-centric" evolution implies to provide contents and personalized services to the user, depending on location, agenda, preference, at the right time, without technical, spatial and temporal constraints, in a framework of confidence and of shared freedom.

4.1.2 User point of view

First, user has a more and more thorough of the offers. User expects to dispose of rich and pertinent information within the environment, including opinions coming from social networks, from comparison tools and measurement tools. User may also expect to be able to use real engineering and personalized tools. The price based on usage offers a wide flexibility to the user. Per share offers are replaced by packages of customizable services.

Services offers should be adjusted to lifestyle changes, users' habits, especially in urban environment, but also in rural environment which create insulation.

Services operating hours reach out to 24 hours a day, 7 days a week. Dematerialization may reduce user trips and enables home delivery services, signatures of contracts, invoices which is an economy source for users and providers. Dematerialization goes together with eco-attitude.

Personalization means exploitation of client personal data. This situation may be paradoxical because on one hand the client may wish a " user centric" offer and on the other hand the user is sensitive to risks on personal digital privacy. The sensitivity level is variable depending on cultures. The challenge of personal data protection is consequently important and personal data exploitation should have a sufficient counterpart, in terms of added value in services delivery.

This information personalization may be more than the use of collaborative filtering. It may use the users browsing behaviors to offer predictable contents. The proposals remain targeted and coherent, independently of the channel.

Personalization is contextual and uses in particular the location in order to meet expectations of customers who are looking for local services (agencies, shops, cinemas, public services, car parks, etc.).

Secondly, dematerialization results in fully digital managing of data and professional documents (contracts, invoices, flyers, technical contents, administrative supports, mailing and messaging) which transit inside companies and/or in the context of exchanges between partners (administrations, clients, providers, etc). Dematerialization is the replacement of printed documents by digital supports, leading to the paperless office. Beyond supports dematerialization, the commercial activities which have been during a long time supported by physical agencies are dematerialized via web, mobile web, call centers or video call centers.

Moreover "user experience" becomes "multichannel", that means, a coherent service delivery, whatever the access mode to information system and in particular that any done operation, whatever the equipment (terminal) and all the channels.

Additionally a process initiated via one of the channels may be carried over another or several others.

A strong decoupling is needed between the business functions delivered by the heart of the distribution system and the presentation layers.

The evolution of economical organizations including the specialization by profession will need an orchestration of the specific contributions to propose a high added value to the user, a seamless offer rather than an incoherent juxtaposition. Inevitably this leads to design an architecture-oriented service and platforms "as a service" (PaaS).

To complete it should be noted that users grant a very high importance to own mobile phone, which includes a lot of possibilities ("a real swiss knife"), providing comfort, cocooning in the private life, affect, professional efficiency, but also perceived as intrusive.

4.2 User expectations

4.2.1 User experience (UX)

A good digital user experience is based on:

- always on line;
- services easily accessible anytime and everywhere;
- on demand;
- at real-time;
- available in self-service along with a fast helpdesk service response.

For the user, that means a good level of flexibility and control of his digital environment.

People need to find easily and quickly information about a service:

- How to order it?
- How going to pay for it?
- How to configure it?
- How to keep the control on it?

Users also need to be in a relationship of trust with their providers. That means that users benefit of transparency and proofs of security and privacy protection.

As part of the development of the present document a survey has been conducted in order to understand what is the current level of flexibility control, or trust, as perceived by the users themselves, and what should be expected for the future.

Four pillars for a good quality of user experience were identified:

- **Control:** the ability to manage the device or the subscription.

  i.e.: connection priority, control of applications in the background, battery life, etc.

- **Privacy and security:** the need of transparency security and privacy protection.

  i.e.: cookies control, localization control, the ability to hide the text of sms received, etc.

- **Flexibility and customization:** people want to have services adapted to their profile, and the context of use.

  i.e.: setting according to the location, smart synchronization, senior applications or parameters, etc.

- **Affordance:** in relation with user friendly conception of the services.

  i.e.: plug and play concept, clarity and contextual menu, banishment of technical vocabulary, some help notice or bubble information, etc.

All these expectations are the same whether for private or professional use.

Figure 2 shows the respective weight of each pillar according to the customer as a result of the survey.